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Copper : Molybdenum sub-oxide blend as Transparent Conductive Electrode (TCE) indium free

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Auteur	Hssein, M [1], Cattin, Linda [2], Morsli, Mustapha [3], Addou, Mohammed [4], Bernède, Jean Christian [5]
Pays	Maroc
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Mots-clés	copper diffusion [6], ITO free electrode [7], Molybdenum oxide [8], sheet resistance. [9], Transparent conductive electrode [10]
Résumé en anglais	Oxide/Metal/Oxide structures have been shown to be promising alternatives to ITO. In such structures, in order to decrease the high light reflection of the metal film it is embedded between two metal oxides dielectric. MoO3-x is often used as oxide due to its capacity to be a performing anode buffer layer in organic solar cells, while silver is the metal the most often used [1]. Some attempts to use cheaper metal such as copper have been done. However it was shown that Cu diffuses strongly into MoO3-x [2]. Here we used this property to grow simple new transparent conductive oxide (TCE), i.e. Cu: MoO3-x blend. After the deposition of a thin Cu layer, a film of MoO3-x is deposited by evaporation. An XPS study shows more than 50% of Cu is present at the surface of the structure. In order to limit the Cu diffusion an ultra-thin Al layer is deposited onto MoO3-x. Then, in order to obtain a good hole collecting contact with the electron donor of the organic solar cells, a second MoO3-x layer is deposited. After optimization of the thickness of the different layers, the optimum structure is as follow: Cu (10 nm):MoO3-x (20nm)/Al (1 nm)/ MoO3-x (10 nm). The sheet resistance of this structure is Rsq = 5.2 Ω/sq and its transmittance is T max = 65%. The factor of merit ΦM = T10/Rsq = 2.5 10-3 Ω-1, which made this new TCE promising as anode in organic solar cells.
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